LONDON-WEST MIDLANDS ENVIRONMENTAL STATEMENT

Volume 5 | Technical Appendices

CFA7 | Colne Valley

Data appendix (AQ-001-007)

Air quality

November 2013

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Department for Transport

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Contents

List of tables

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1 Introduction

1.1.1 The air quality appendix for the Colne Valley community forum area (CFA7) comprises:

- discussion of the policy framework (Section 2);
- baseline air quality data (Section 3);
- dust impact evaluation and risk rating (Section 4); and
- air quality assessment - road traffic (Section 5).

1.1.2 Maps referred to throughout the air quality appendix are contained within the Volume 5, Air Quality Map Book.

2 Policy framework

2.1.1 The London Plan[1] forms the regional spatial strategy for Greater London and integrates economic, environmental, transport and social frameworks. Specifically for air quality, it seeks to achieve reductions in pollutant emissions and minimise public exposure to pollution. Policy 7.14 sets out a number of objectives such as minimising increased exposure to existing poor air quality, the need to reduce emissions from demolition and construction activities using best practice and the provision of on-site mitigation measures during development.

2.1.2 The Mayor's Air Quality Strategy[2] and Supplementary Planning Guidance on Sustainable Design and Construction[3] set out actions for improving London's air quality and include measures aimed at reducing emissions from transport and new developments. A key objective of the strategy is to make better use of the planning process so that new developments do not contribute to air pollution. Policy 3 also gives support to the expansion of competitive rail-based alternatives to aviation, including the development of a national high speed rail network.

2.1.3 At the local level, two of the local authorities within the study area have policies that seek to limit pollution levels, improve air quality and reduce emissions from development. These include the strategic objectives SO10 and SO11, and Policies EM1 and EM8 of the Hillingdon Local Plan: Part 1[4]; the Policy OE1 of the Hillingdon Local Plan: Part 2[5]; and the Core Policy 13 of the South Bucks Core Strategy (2011)[6].

2.1.4 In addition, local and regional guidance relevant to this assessment includes the London Borough of Hillingdon (LBHi) Air Quality Action Plan (2004)[7] and South Bucks Air Quality Action Plan (2006)[8].

[1] Greater London Authority (GLA) (2011), *The London Plan: Spatial Development Strategy for Greater London, GLA, London 2011.*
[2] Greater London Authority (2010) *Clearing the Air: The Mayor's Air Quality Strategy 2010.*
[3] Greater London Authority (2006) *Sustainable Design and Construction: The London Plan Supplementary Planning Guidance 2006.*
[4] London Borough of Hillingdon (2012) *Hillingdon Local Plan: Part 1*
[5] London Borough of Hillingdon (2013) *Hillingdon Local Plan: Part 2*
[6] South Bucks District Council (2011) *South Bucks* Local Development Framework, *Core Strategy Development Plan Document*
[7] London Borough of Hillingdon (2004) *Air Quality Action Plan 2004.*
[8] South Bucks District Council (2006) *Consultation Draft Air Quality Action Plan 2006.*

3 Baseline air quality data

3.1 Existing air quality

Local authority review and assessment information

3.1.1 LBHi, South Bucks and Three Rivers Councils all carry out monitoring within their areas in order to assist with assessing air quality and to identify any areas of poor air quality.

3.1.2 As part of its review and assessment process, LBHi has declared an air quality management area (AQMA) for exceedances of the annual mean NO2 standard across the southern area of the borough. The southern part of the borough is characterised by a greater density of traffic than the northern part, as well as Heathrow Airport. The Colne Valley area lies immediately to the north of the AQMA boundary.

3.1.3 South Bucks District Council has declared an AQMA across an area encompassing the M4, M25 and M40 for exceedances of the annual mean NO2 standard. The South Bucks AQMA lies more than 1km from the route although proposed construction compounds extend to the AQMA boundary.

3.1.4 Three Rivers District Council has declared three AQMAs: Chorleywood for exceedances of the annual mean NO2 standard, as well as exceedances of the annual mean particulate matter as PM10 standard; Chandlers Cross for exceedances of the NO2 and PM10 standards and Kings Langley for exceedances of the NO2 annual standard. All of these are outside the study area. The closest of these AQMAs is Chorleywood AQMA, which lies close to Junction 18 of the M25 and is located more than 4km from the Proposed Scheme.

3.1.5 Baseline concentrations of NO2 and particulate matter such as PM10 and PM2.5 in the study area are likely to be in compliance with air quality standards given low background concentrations across the district, although higher concentrations will occur in built-up areas.

Local air quality monitoring data

3.1.6 The pollutant concentrations can be compared to the air quality standards:

- 40µg/m^3 as an annual mean for NO2 and PM10;
- 200µg/m^3 one-hour mean for NO2 not to be exceeded more than 18 times a year (equivalent to the 99.8th percentile of the one-hour mean);
- 50µg/m^3 24-hour mean for PM10 not to be exceeded more than 35 times a year (equivalent to the 90.4th percentile of the 24-hour mean); and
- 25µg/m^3 as an annual mean for PM2.5.

Continuous monitoring

3.1.7 There are no continuous monitors within the study area that are relevant to this assessment.

Diffusion tubes

3.1.8 There are no diffusion tube monitors within the study area that are relevant to this assessment.

Background pollutant concentrations

3.1.9 Estimates of background air quality have been taken from Department for Environment, Food and Rural Affairs (Defra) maps[9]. Background NO2 concentrations are below air quality standards throughout the study area with annual mean concentrations in the range of 16.4µg/m^3 - 22.0µg/m^3 in 2012. Background PM10 concentrations are within air quality standards throughout the study area with annual mean concentrations in the range of 15.8µg/m^3 - 19.2µg/m^3 in 2012.

Local emission sources

3.1.10 The main source of pollution in the study area is road traffic. Major roads include the M25, A40 and the A412.

3.2 Receptors

Human

Construction phase

3.2.1 Potential receptors are primarily those residential properties close to construction activity and alongside roads where traffic flows will change as a consequence of construction activity. Notable receptors in relation to construction activity include residential properties at Dews Farm Cottages, The Tilehouse, Cedar Grange, Durdent Court, Weybeards Cottages and properties on Sunnyhill Road. There are many receptors that are close to roads where traffic flows will change, indicated in Table 5. Receptors at greatest risk of dust effects are indicated in Map AQ-02-007-01 (Volume 5, Air Quality Map Book).

Operational phase

3.2.2 Once operational only receptors located on roads where there will be possible increases in operational traffic have the potential to be affected.

Ecological

Construction phase

3.2.3 The Mid Colne Valley Site of Special Scientific Interest (SSSI) has been considered for the construction dust assessment and in relation to road traffic. Fray's Farm Meadows SSSI has been considered in relation to road traffic.

Operational phase

3.2.4 No ecological receptors in the study area are predicted to be affected by air quality as a result of the operational phase.

[9] Defra; Background Pollutant Concentration Maps; http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html; Accessed: July 2013

4 Dust impact evaluation and risk rating

4.1.1 The following sections provide details of the assessment of construction impacts following the Institute of Air Quality Management (IAQM) guidance[10]. Where considered useful to identify receptors and their relationship to the construction activity, a specific figure is provided. On-site haul movements were assessed explicitly.

4.1.2 The dust assessment criteria for the haul route are based on those for earthworks, as set out in the IAQM guidance. This emission phase was considered to be the most applicable, as the assessment of impacts from earthworks will depend, in part, on the passage of vehicles over open surfaces. It was assumed that significant effects would not occur beyond a distance of 50m from the haul route, again based on interpretation of the earthworks criteria, and that all areas of the haul route will be subject to more than 10 vehicle movements per day. On the basis of criteria for earthworks within the IAQM guidance, the dust emission class for the haul route is large. Wherever there are receptors within 50m of a haul route, the sensitivity of the receiving environment was derived using the IAQM guidance. The need for a local environmental management plan (LEMP), as directed by the draft Code of Construction Practice[11] (CoCP), was then considered.

Table 1: Evaluation and risk rating of construction activities

Activity	Distance to nearest receptor	Dust emission class	Dust risk category	Sensitivity of surrounding area	Magnitude of impact (with draft CoCP mitigation measures)	Principal justifications
Cuttings and embankments - Dew's Farm Cottage, Cedar Grange, The Tilehouse, Durdent Court (Map AQ-02-007-01, Figures 7.1 and 7.3 (Volume 5, Air Quality map Book))						
Demolition	N/A	N/A	N/A	N/A	N/A	No demolitions are required.
Earthworks	50-100m	Large	Medium	Low	Negligible	1. Total site area greater than 10,000m^2. 2. No receptors within 20m.

[10] Institute of Air Quality Management (IAQM), (2011), *Guidance on the assessment of the impacts of construction on air quality and the determination of their significance*.
[11] Volume 5: Appendix CT-003-000

Activity	Distance to nearest receptor	Dust emission class	Dust risk category	Sensitivity of surrounding area	Magnitude of impact (with draft CoCP mitigation measures)	Principal justifications
Construction	100-200m	Large	Medium	Low	Negligible	1. Use of dusty construction materials. 2. No receptors within 20m.
Trackout	50-100m	Large	Medium	Low	Negligible	1. More than 100 heavy goods vehicle (HGV) trips in any one day. 2. Fewer than 10 receptors within 20m.
Haul route	N/A	N/A	N/A	N/A	N/A	1. No receptors within 50m of the haul route.
Cuttings and embankments - Mid Colne Valley SSSI (Map AQ-02-007-01, Figure 7.2 (Volume 5, Air Quality Map Book))						
Demolition	N/A	N/A	N/A	N/A	N/A	No demolitions are required.
Earthworks	N/A	N/A	N/A	N/A	N/A	1. No receptors within 100m of the site.
Construction	N/A	N/A	N/A	N/A	N/A	1. No receptors within 100m of the site.
Trackout	20-100m	Large	Medium	High	Negligible	1. More than 100 HGV trips in any one day. 2. The Mid Colne Valley SSSI exists 20-100m from the roadside within 500m of the site entrance.
Haul route	Less than 50m	Large	Medium	High	Negligible	1. More than 10 HGV movements per day. 2. The Mid Colne Valley

Activity	Distance to nearest receptor	Dust emission class	Dust risk category	Sensitivity of surrounding area	Magnitude of impact (with draft CoCP mitigation measures)	Principal justifications
						SSSI exists within 50m of the site.
The Colne Valley viaduct - Weybeards Cottages (Map AQ-02-007-01, Figure 7.2 (Volume 5, Air Quality Map Book))						
Demolition	Less than 20m	Medium	High	Medium	Negligible	1. Potentially dusty construction material. 2. Fewer than 10 receptors within 20m of the site.
Earthworks	Less than 20m	Large	High	Medium	Negligible	1. Total site area greater than 10,000m^2. 2. Fewer than 10 receptors within 20m of the site.
Construction	Less than 20m	Large	High	Medium	Negligible	1. Use of dusty construction materials. 2. Fewer than 10 receptors within 20m of the site.
Trackout	Less than 20m	Large	High	Medium	Negligible	1. More than 100 HGV trips in any one day. 2. Fewer than 10 receptors within 20m.
Haul route	N/A	N/A	N/A	N/A	N/A	1. No receptors within 50m of the haul route.
The Colne Valley viaduct - Mid Colne Valley SSSI (Map AQ-02-007-01, Figure 7.2 (Volume 5, Air Quality Map Book))						
Demolition	40-100m	Medium	Low	High	Negligible	1. Potentially dusty construction material. 2. The Mid Colne Valley SSSI is more than 40m

Activity	Distance to nearest receptor	Dust emission class	Dust risk category	Sensitivity of surrounding area	Magnitude of impact (with draft CoCP mitigation measures)	Principal justifications
						from the site.
Earthworks	Less than 20m	Large	Medium	High	Negligible	1. Total site area greater than 10,000m^2 2. The Mid Colne Valley SSSI is located less than 20m from the site.
Construction	Less than 20m	Large	Medium	High	Negligible	1. Use of dusty construction materials. 2. The Mid Colne Valley SSSI is located less than 20m from the site.
Trackout	Less than 20m	Large	Medium	High	Negligible	1. More than 100 HGV trips in any one day. 2. Fewer than 10 receptors within 20m.
Haul route	Less than 50m	Large	Medium	High	Negligible	1. More than 10 HGV movements per day. 2. The Mid Colne Valley SSSI is located less than 50m from the haul route.
Chiltern tunnel south portal and associated main construction site - Sunnyhill Road (Map AQ-02-07-01, Figure 7.4 (Volume 5, Air Quality Map Book))						
Demolition	N/A	N/A	N/A	N/A	N/A	No demolitions required.
Earthworks	20-50m	Large	High	Low	Negligible	1. Total site area greater than 10,000m^2. 2. No receptors within 20m of the site.
Construction	200-350m	Large	Low	Low	Negligible	1. Use of dusty construction materials.

Activity	Distance to nearest receptor	Dust emission class	Dust risk category	Sensitivity of surrounding area	Magnitude of impact (with draft CoCP mitigation measures)	Principal justifications
						2. No receptors within 20m of the site.
Trackout	Less than 20m	Large	High	Medium	Negligible	1. More than 100 HGV trips in any one day. 2. Fewer than 10 receptors within 20m.
Haul route	N/A	N/A	N/A	N/A	N/A	1. No receptors within 50m of haul route.

Table 2: Summary of construction dust impacts and effects

Location	**Magnitude of impact**	**Effect of dust-generating activities**	**Additional mitigation**
Cuttings and embankments	Negligible	Not significant	None required
The Colne Valley viaduct	Negligible	Not significant	None required
Chiltern Tunnel south portal and associated main construction site	Negligible	Not significant	None required

5 Air quality assessment - road traffic

5.1 Overall assessment approach

5.1.1 The air quality assessment for road-related emissions has considered the use of three different approaches based on the scale of changes in traffic and road alignment. Where the Design Manual for Roads and Bridges[12] (DMRB) thresholds detailed in the Scope and Methodology Report (SMR) (Volume 5: Appendix CT-001-000/1) are not exceeded, no additional assessment is required, as the air quality impacts will be minimal. If these thresholds are breached then a quantitative assessment has been carried out.

5.1.2 Where the road configuration is straightforward, the DMRB screening method has been used to predict changes in air quality. Where the road layout is considered to be complex or where the use of the DMRB screening method indicated that there will be a potential exceedance of air quality standards, the atmospheric dispersion model ADMS-Roads has been used for the assessment. Professional judgment has been used to select the appropriate tool for each area.

5.1.3 In this study area both the DMRB screening method and the ADMS-Roads model were used for the assessment.

5.1.4 An assessment of nutrient nitrogen and NOx concentrations was also undertaken at the Mid Colne Valley SSSI and at the Fray's Farm Meadows SSSI, because changes in traffic during construction on roads in close proximity were found to meet DMRB criteria for further assessment. The critical level and critical load, and baseline nitrogen for the main habitats within the SSSI were taken from the Air Pollution Information System website[13].

5.1.5 Predicted NOx concentrations as a result of vehicle emissions were used to quantify nutrient nitrogen deposition in terms of in kilograms of nitrogen per hectare per year (kg N/ha/year). Nitrogen deposition can lead to soil nutrification and impacts on ecosystem biodiversity.

5.1.6 The main habitat for Mid Colne Valley SSSI is sub-atlantic semi-dry calcareous grassland, with an empirical critical load of 15 - 25 kg N/ha/year and an average deposition of 21.9 kg N/ha/year in 2011. It can be observed that the existing nitrogen deposition is already exceeding the lower end of the critical load range.

5.1.7 The main habitat for Fray's Farm Meadows is low and medium altitude hay meadows, with an empirical critical load of 20 - 30 kg N/ha/year and an average deposition of 19.9 kg N/ha/year in 2011. It can be observed that the existing nitrogen deposition is just below the lower end of the critical load range.

[12] Highways Agency, (2007), *The Design Manual for Roads and Bridges (Volume 11, Section 3, Part 1 Air Quality HA207/07)*
[13] Air Pollution Information System; Site relevant critical loads and source attribution; http://www.apis.ac.uk/srcl; Accessed August 2013.

5.1.8 Future deposition rates for these habitats were calculated following the DMRB methodology. The predicted nitrogen deposition rate and NOx concentrations were calculated for the future construction year (2017) with and without the Proposed Scheme. The predicted contribution of the traffic to nitrogen deposition rate was compared to 1% of the critical load, as a test of insignificance. The total deposition rate was also compared to 70% of the critical load, as an additional assessment criterion. This approach follows that used by the Environment Agency and Natural England when assessing the impacts of installations under the Environmental Permitting Regulations.

Assessing congestion

5.1.9 For the ADMS-Roads modelling, where speed data were available, queues were assumed to occur on roads with an average speed of less than 50% of the speed limit. Queue speeds of 5km/h were assumed. A queue length of 25-50m was assumed, depending on the speed on the road[14]. In the absence of information on the occurrence of queuing, it was assumed that queuing occurred between 7am and 7pm.

5.2 Model inputs and verification

Model parameters for detailed assessment

5.2.1 The ADMS-Roads model was used for the detailed assessment. A surface roughness length of 1.5m, surface roughness at meteorological site of 0.2m, minimum Monin Obukhov length of 100m and latitude of 51.5 degrees were used in the detailed assessment. All other model parameters were model default settings. Meteorological data from the London Heathrow monitoring site was used.

Model verification

5.2.2 Since the model predicts nitrogen oxide (NOx) contributions for the modelled roads, this was initially compared to the NOx road contribution derived from NOx concentrations (where available) measured at monitoring sites and Defra background maps.

5.2.3 Monitoring sites were chosen from across the traffic model area, which extends east of the study area into London. Sites where nearby busy roads were not included in the traffic model data set (and which, therefore, could not be modelled correctly as roadside sites with the traffic data set) or where monitored road NOx was found to be negative were excluded from assessment. The results of this comparison are shown in Table 3.

[14] Queue length (in metres) was calculated using the following formula: l = 50 -((v/0.5vl) x 25), where l = queue length, v = road speed, vl = speed limit

Table 3: Comparison of monitored and modelled NOx concentrations for verification

Site	Ordnance Survey co-ordinates	Monitored total NO_2	Monitored total NOx	Background NO_2	Background NOx	Monitored road NOx	Modelled road NOx	Monitored/ modelled road NOx
LBB - Ikea (AURN)	520866, 185169	76.0	257.4	31.5	56.0	201.4	44.7	4.5
LBB - John Keble Primary School	521619, 183554	41.1	86.7	35.7	67.0	19.7	14.9	1.3
LBE - Hanger Lane Gyratory (AURN)	518537, 182708	95.0	324.6	37.1	69.2	255.4	36.2	7.1
LBE - Western Avenue (AURN)	520430, 181950	73.3	184.8	38.6	74.6	110.2	35.4	3.1
LBHi - South Ruislip (AURN)	510835, 184916	52.1	111.7	26.5	43.7	68.0	12.2	5.6
LBHi - Oxford Avenue (AURN)	509551, 176974	44.1	78.4	36.2	69.2	9.2	3.3	2.8
LBHa - Pinner Road (AURN)	513504, 188998	46.8	110.4	24.0	39.1	71.3	6.3	11.3
RBKC - Cromwell Road (AURN)	526524, 178965	69.1	155.9	43.8	82.4	73.5	11.4	6.5
RBKC - Knightsbridge (AURN)	527518, 179395	92.3	229.2	46.2	87.4	141.8	21.3	6.7
RBKC - Kings Road (AURN)	527268, 178089	92.6	224.3	43.8	82.8	141.4	15.8	9.0
LBB - junction of Kingsbury Road	521447, 188730	54.0	N/A	28.8	49.6	49.9	16.1	3.1

Site	Ordnance Survey co-ordinates	Monitored total NO2	Monitored total NOx	Background NO2	Background NOx	Monitored road NOx	Modelled road NOx	Monitored/ modelled road NOx
and Edgware Road								
LBB - junction of North Circular Road and Chartley Avenue	521222, 186122	93.0	N/A	33.7	60.3	175.2	47.8	3.7
LBB - junction of Dudden Hill Lane and High Road	522191, 184821	60.0	N/A	31.9	56.8	59.4	33.5	1.8
LBB - junction of Dollis Hill Lane and Edgware Road	523192, 186570	76.0	N/A	31.8	56.4	114.3	23.4	4.9
LBB - Chichele Road, near Anson Road	523692, 185372	65.0	N/A	31.8	56.4	75.8	15.3	5.0
LBB - High Street, Harlesden	521743, 183361	76.0	N/A	35.7	67.0	100.5	33.9	3.0
LBB - Kilburn Bridge	525461, 183558	101.0	N/A	36.6	68.5	196.5	20.2	9.7
LBE - Horn Lane AQMS (co-located triplicate)	520432, 181428	52.0	N/A	38.6	74.6	16.7	13.6	1.2
LBE - 326 Western Avenue	520424, 181957	59.0	N/A	38.6	74.6	35.9	33.0	1.1
LBE - 57 - 75 Old Oak Common Lane	521557, 180996	49.0	N/A	36.1	66.9	17.1	15.0	1.1

Site	Ordnance Survey co-ordinates	Monitored total NO_2	Monitored total NOx	Background NO_2	Background NOx	Monitored road NOx	Modelled road NOx	Monitored/ modelled road NOx
LBE - 39 Old Oak Lane	521587, 182684	50.0	N/A	36.2	69.4	17.0	13.0	1.3
LBE - 5 Leamington Park	520532, 181517	46.0	N/A	38.6	74.6	1.8	19.2	0.1
LBHF - Westway	522548, 180960	77.0	N/A	36.9	66.7	104.5	38.1	2.7
LBHF - Hammersmith Broadway	523327, 178484	77.0	N/A	45.5	86.3	80.0	29.8	2.7
LBHF - Talgarth Road	524150, 178363	56.0	N/A	43.7	82.2	19.3	34.9	0.6
LBHF - Uxbridge Road	522861, 180061	43.0	N/A	36.9	66.7	2.6	8.0	0.3
RBKC - Earls Court Station	525548, 178556	101.0	N/A	45.7	87.1	171.1	40.3	4.2
RBKC - Chatsworth Court	525263, 178936	51.0	N/A	45.7	87.1	1.3	10.2	0.1
RBKC - Sloane Square	528011, 178675	81.0	N/A	45.2	85.0	95.8	19.7	4.9
RBKC - Chelsea Physic Garden (Gate)	527726, 177727	59.0	N/A	40.0	72.8	37.9	14.6	2.6
RBKC - Sloane Avenue	527411, 178659	56.0	N/A	43.8	82.8	18.7	8.0	2.3
RBKC - Cromwell Road (Natural	526550, 178968	70.0	N/A	43.8	82.4	60.9	8.3	7.4

Site	Ordnance Survey co-ordinates	Monitored total NO2	Monitored total NOx	Background NO2	Background NOx	Monitored road NOx	Modelled road NOx	Monitored/ modelled road NOx
History Museum)								
RBKC - junction of Pavillion Street and Sloane Avenue	527889, 179145	54.0	N/A	46.2	87.4	8.7	11.1	0.8
RBKC - junction of Kensington High Street and Kensington Church Street	525630, 179674	62.0	N/A	43.8	83.2	35.1	18.2	1.9
RBKC - junction of Fulham Road and Limerston St	526377, 177867	55.0	N/A	43.1	80.6	18.4	10.9	1.7
RBKC - Warwick Road	524825, 178902	50.0	N/A	43.7	82.2	3.9	13.6	0.3
RBKC - Ladbroke Grove / North Kensington Library	524342, 181271	53.0	N/A	43.3	83.3	10.3	27.0	0.4
RBKC - junction of Cromwell Road and Earls Court Road	525355, 178841	84.0	N/A	45.7	87.1	104.3	46.0	2.3

5.2.4 The calculated model adjustment factor for the road contribution of NOx was 3.4. This was applied to all NOx results from the ADMS-Roads modelling. This is line with Defra guidance[15] on model verification.

5.2.5 A final check was then made to compare the total NO2 concentrations from the modelling to the monitored data. This is shown in Table 4.

Table 4: Comparison of monitored and modelled annual average NO2 concentrations

Site	**Monitored concentration (µg/m^3)**	**Modelled concentration (µg/m^3)**	**Difference ((modelled - monitored)/monitored) x 100**
LBB - Ikea (AURN)	76.0	81.2	7%
LBB - John Keble Primary School	41.1	55.5	35%
LBE - Hanger Lane Gyratory (AURN)	95.0	78.1	-18%
LBE - Western Avenue (AURN)	73.3	78.6	7%
LBHi - South Ruislip (AURN)	52.1	44.1	-15%
LBHi - Oxford Avenue (AURN)	44.1	41.0	-7%
LBHa - Pinner Road (AURN)	46.8	33.8	-28%
RBKC - Cromwell Road (AURN)	69.1	58.6	-15%
RBKC - Knightsbridge (AURN)	92.3	71.4	-23%
RBKC - Kings Road (AURN)	92.6	63.6	-31%
LBB - junction of Kingsbury Road and Edgware Road	54.0	51.0	-6%
LBB - junction of North Circular Road and Chartley Avenue	93.0	85.6	-8%
LBB - junction of Dudden Hill Lane and High Road	60.0	71.4	19%
LBB - junction of Dollis Hill Lane and Edgware Road	76.0	61.4	-19%
LBB - Chichele Road, near Anson Road	65.0	52.5	-19%
LBB - High Street, Harlesden	76.0	74.9	-1%
LBB - Kilburn Bridge	101.0	62.1	-38%

[15] Department for Environment, Food and Rural Affairs (2009) *Technical Guidance Note LAQM TG(09)*

Site	Monitored concentration (µg/m^3)	Modelled concentration (µg/m^3)	Difference ((modelled - monitored)/monitored) x 100
LBE - Horn Lane AQMS (co-located triplicate)	52.0	56.6	9%
LBE - 326 Western Avenue	59.0	76.4	30%
LBE - 57 - 75 Old Oak Common Lane	49.0	56.0	14%
LBE - 39 Old Oak Lane	50.0	53.8	8%
LBE - 5 Leamington Park	46.0	62.8	36%
LBHF - Westway	77.0	79.7	3%
LBHF - Hammersmith Broadway	77.0	79.0	3%
LBHF - Talgarth Road	56.0	82.2	47%
LBHF - Uxbridge Road	43.0	48.2	12%
RBKC - Earls Court Station	101.0	88.6	-12%
RBKC - Chatsworth Court	51.0	58.9	15%
RBKC - Sloane Square	81.0	69.0	-15%
RBKC - Chelsea Physic Garden (Gate)	59.0	58.9	0%
RBKC - Sloane Avenue	56.0	54.6	-2%
RBKC - Cromwell Road (Natural History Museum)	70.0	54.9	-22%
RBKC - junction of Pavillion Street and Sloane Avenue	54.0	60.4	12%
RBKC - junction of Kensington High Street and Kensington Church Street	62.0	66.2	7%
RBKC - junction of Fulham Road and Limerston St	55.0	57.3	4%
RBKC - Warwick Road	50.0	61.1	22%
RBKC - Ladbroke Grove / North Kensington Library	53.0	74.5	41%
RBKC - junction of Cromwell Road and Earls Court Road	84.0	93.4	11%

5.2.6 As the majority of modelled NO2 concentrations were within 25% of the monitored concentrations, no further adjustment was undertaken.

5.3 Construction traffic model

5.3.1 Construction traffic information on which this assessment is based is detailed in Volume 5: Appendix TR-001-000. Scenarios assessed were based on maximum traffic on affected roads during the construction phase of the Proposed Scheme.

Receptors assessed

5.3.2 For all road links where DMRB criteria for assessing local air quality were met due to increased traffic flows, a number of receptors representative of worst-case exposure locations were selected for assessment. These included locations representative of highest pollutant concentrations along the roads, including closest to junctions or to the road itself.

5.3.3 All receptors where DMRB screening identified a likely moderate adverse or significant adverse impact were also modelled within ADMS-Roads. Additional receptors close to DMRB receptors were added in order to ensure that worst-case exposure locations were captured.

5.3.4 Receptors assessed are presented in Table 5 and in Map AQ-01-007 (Volume 5, Air Quality Map Book).

Table 5: Modelled receptors (construction phase)

Receptor	Description/location	Ordnance Survey coordinates
7-1	Oakwood (Swakeleys Road)	506231, 185626
7-2	Frays Farm (A40 (between J1 and Swakeleys Road junction))	505764, 185569
7-3	4 Chairmans Walk (A412 Denham Way/North Orbital Road (south of satellite compounds))	503993, 188600
7-4	Coldharbour Farm Cottages	501694, 189317
7-5	Properties on Chalfont Road (Chalfont Road)	503105, 192692
7-6	Properties on Hornhill Road (Hornhill Road (east of Woodland Road))	503096, 192432
7-7	Properties on Woodland Road (Woodland Road)	502965, 192246
7-8	Properties on Hornhill Road/The Hawthorns (Hornhill Road (west of Woodland Road))	502640, 192220
7-9	1 The Drive	506182, 185614
7-10	238 Swakeleys Road	506321, 185874
7-11	Mid Colne Valley SSSI (A412 Denham Way/North Orbital Road (south of	504008, 189279

Receptor	Description/location	Ordnance Survey coordinates
	satellite compounds))	
7-12	Fray's Farm Meadows SSSI	505713, 185651
7-13	1 Harvil Road	506500, 186100
7-14	248A Swakeleys Road	506243, 185738
7-15	238 Swakeleys Road	506317, 185867
7-16	220A Swakeleys Road	506409, 185987
7-17	12 Lodore Green	506503, 186064

Background concentrations

5.3.5 The background concentrations used in the assessment are shown in Table 6 taken from the Defra maps.

Table 6: Background 2017 concentrations at assessed receptors

Receptor (or zone of receptors)	Concentrations (µg/m^3)		
	NOx	NO2	PM10
7-1 Oakwood	33.1	21.0	17.3
7-2 Frays Farm	36.0	22.6	17.5
7-3 4 Chairmans Walk	24.1	16.0	15.0
7-4 Coldharbour Farm Cottages	30.4	19.6	17.2
7-5 Properties on Chalfont Road	20.9	14.0	15.2
7-6 Properties on Hornhill Road	20.9	14.0	15.2
7-7 Properties on Woodland Road	25.3	16.6	17.5
7-8 Properties on Hornhill Road/The Hawthorns	25.3	16.6	17.5
7-9 Property at junction of Swakeleys Road and The Drive	25.1	17.2	11.9
7-10 Property on Swakeleys Road	31.0	17.3	12.0
7-11 Mid Colne Valley SSSI	24.1	N/A	N/A
7-12 Fray's Farm Meadows SSSI	32.9	N/A	N/A
7-13 1 Harvil Road	24.7	16.4	15.0

Receptor (or zone of receptors)	Concentrations (µg/m^3)		
	NOx	**NO2**	**PM10**
7-14 248A Swakeleys Road	43.2	21.0	18.4
7-15 238 Swakeleys Road	43.2	16.4	18.4
7-16 220A Swakeleys Road	43.2	16.4	18.4
7-17 12 Lodore Green	31.0	16.4	15.9

Design Manual for Roads and Bridges model results

5.3.6 This section provides the summary of the modelled pollutant concentrations for the assessed receptors using the DMRB methodology. The magnitude of change and impact descriptor are derived following the Environmental Protection UK (EPUK) methodology[16]. The criteria used to define significance at the ecological sites identified are in line with guidance set out in the Environment Agency H1 guidance document[17], which in turns refers back to joint Environment Agency/Natural England guidance.

Table 7: Summary of DMRB annual mean NO_2 results (construction phase)

Receptor	Concentrations (µg/m^3)			Change in concentrations (µg/m^3)	Magnitude of change	Impact descriptor
	2012 baseline	2017 without Proposed Scheme	2017 with Proposed Scheme			
7-1	32.9	28.0	29.0	1.0	Small increase	Negligible
7-2	33.0	28.4	28.6	0.2	Imperceptible increase	Negligible
7-3	21.2	18.1	18.4	0.3	Imperceptible increase	Negligible
7-4	33.4	28.0	28.2	0.2	Imperceptible increase	Negligible
7-5	18.4	15.1	15.4	0.3	Imperceptible increase	Negligible
7-6	17.9	14.5	14.8	0.3	Imperceptible increase	Negligible
7-7	22.4	17.1	17.4	0.3	Imperceptible increase	Negligible
7-8	22.4	17.1	17.3	0.3	Imperceptible increase	Negligible
7-9	46.1	45.8	57.3	11.5	Large	Substantial adverse
7-10	31.2	32.6	41.1	8.5	Large	Substantial adverse

[16] Environmental Protection UK (EPUK), (2010), *Development Control: Planning for Air Quality 2010.*
[17] Environment Agency, (2011), *H1 Annex F Air Emissions V2.2*

Table 8: Summary of DMRB annual mean PM10 results (construction phase)

Receptor	Concentrations (µg/m^3)			Change in concentrations (µg/m^3)	Magnitude of change	Impact descriptor
	2012 baseline	2017 without Proposed Scheme	2017 with Proposed Scheme			
7-1	20.0	18.9	19.0	0.1	Imperceptible increase	Negligible
7-2	19.8	18.6	18.7	<0.1	Imperceptible increase	Negligible
7-3	16.3	15.5	15.5	0.1	Imperceptible increase	Negligible
7-4	20.1	19.0	19.0	<0.1	Imperceptible increase	Negligible
7-5	16.4	15.5	15.6	0.1	Imperceptible increase	Negligible
7-6	16.2	15.3	15.4	0.1	Imperceptible increase	Negligible
7-7	18.6	17.6	17.7	0.1	Imperceptible increase	Negligible
7-8	18.6	17.6	17.7	0.1	Imperceptible increase	Negligible
7-9	21.8	21.1	21.8	0.7	Small	Negligible
7-10	20.1	19.7	20.2	0.5	Small	Negligible

Table 9: Critical level assessment for the protection of vegetation

Receptor	NOx concentrations (µg/m^3)							
	2012 baseline	2017 without Proposed Scheme	2017 with Proposed Scheme	Change in concentrations (µg/m^3)	Critical level (µg/m^3) (annual mean)	Change in concentrations as % of critical level	Total NOx as a % of critical level	Potentially significant? (change in concentration greater than 1% and total NOx greater than 70%)

Receptor	NOx concentrations (µg/m^3)							
7-12	35.5	29.0	29.7	0.7	30	2.2	98.9	Yes
7-13	202.6	137.7	150.6	12.9	30	43.0	502.0	Yes

Table 10: Critical load - nutrient nitrogen deposition

Receptor	Nitrogen deposition rate (kg N/ha/year)							
	2012 baseline deposition	**2017 without Proposed Scheme**	**2017 with Proposed Scheme**	**Change in deposition**	**Critical load range (kg N/ha/yr)**	**Change in deposition as % of critical load**	**Total nitrogen deposition as a % of critical load**	**Potentially significant?[18]**
7-12	22.0	22.7	22.8	0.1	15-25	0.6 (low) 0.4 (high)	152 (low) 91.1 (high)	No
7-13	19.9	50.1	53.8	3.7	20-30	18.6 (low) 12.4 (high)	268.9 (low) 179.2 (high)	Yes

[18] Change is deposition greater than 1% of critical load and total deposition greater than 70% of critical load and total deposition greater than 70% of critical load

5.3.7 Changes in modelled concentrations with and without the Proposed Scheme have been calculated to determine the impact to local air quality. Two large increases in NO_2 concentrations have been predicted at residential receptors on Swakeleys Road indicative of worst-case exposure on roads identified as a result of meeting the DMRB criteria for further assessment. Substantial adverse impacts have been predicted as a result of these increases in NO_2 concentrations and therefore require further, more detailed modelling. All other findings indicate small and negligible increases in NO_2 resulting in negligible impacts.

5.3.8 The changes in PM10 concentrations are small at two receptors and imperceptible at all other receptors identified. As a result, a negligible impact was found at all receptors in relation to PM10, with no further modelling required.

From the ecological assessment it can be observed that the NOx impact at the Mid Colne Valley SSSI, at a point chosen to be indicative of worst case exposure from traffic related emissions, is greater than 1% of the critical level, and total NOx is greater than 70% of the critical level set for the protection of vegetation. Detailed modelling has therefore been undertaken. Nutrient nitrogen deposition is predicted to have a potentially significant effect.

Detailed modelling results

5.3.9 This section provides the summary of the modelled pollutant concentrations for the assessed receptors. The magnitude of change and impact descriptor are also derived following the EPUK methodology[16]. The criteria used to define significance at the ecological sites identified are in line with guidance set out in the Environment Agency H1 guidance document[19], which in turns refers back to joint Environment Agency/Natural England guidance. With regard to ecology, in order to indicate area of the habitat that may be subject to significant effects the model included transects at increasing distances away from the roadside.

Table 11: Summary of ADMS-Roads annual mean NO2 results (construction phase)

Receptor	NO2 concentrations (µg/m^3)			Change in concentrations (µg/m^3)	Magnitude of change	Impact descriptor
	2012 baseline	2017 without Proposed Scheme	2017 with Proposed Scheme			
7-9	67.1	56.9	64.6	7.7	Large	Substantial adverse
7-10	61.2	52.1	60.3	8.2	Large	Substantial adverse
7-11	39.6	34.1	39.1	5.0	Large	Moderate adverse
7-14	67.1	56.9	64.6	7.7	Large	Substantial adverse
7-15	61.5	52.2	58.5	6.3	Large	Substantial adverse
7-16	60.9	51.8	59.6	7.8	Large	Substantial adverse
7-17	55.9	48.1	56.2	8.1	Large	Substantial adverse
7-18	49.2	41.5	49.5	8.0	Large	Substantial adverse

[19] Environment Agency, (2011), *H1 Annex F Air Emissions V2.2*

Table 12: Summary of ADMS-Roads annual mean PM10 results (construction phase)

Receptor	PM10 concentrations (µg/m^3)			Change in concentrations (µg/m^3)	Magnitude of change	Impact descriptor
	2012 baseline	2017 without Proposed Scheme	2017 with Proposed Scheme			
7-9	25.4	23.5	24.1	0.6	Small	Negligible
7-10	23.1	21.3	21.9	0.6	Small	Negligible
7-11	18.0	16.8	17.2	0.4	Imperceptible	Negligible
7-14	25.4	23.5	24.1	0.6	Small	Negligible
7-15	23.7	21.9	22.5	0.6	Small	Negligible
7-16	23.1	21.4	21.9	0.6	Small	Negligible
7-17	22.3	20.6	21.2	0.6	Small	Negligible
7-18	19.6	18.2	18.7	0.6	Small	Negligible

Table 13: Summary of ADMS-Roads 24-hour PM10 exceedance results (construction phase)

Receptor	PM10 90.4th percentile of 24-hour concentrations (µg/m^3)			Change in concentrations (µg/m^3)	Magnitude of change	Impact descriptor
	2012 baseline	2017 without Proposed Scheme	2017 with Proposed Scheme			
7-9	13.4	9.1	10.4	1.3	Small	Negligible
7-10	8.3	5.2	6.2	0.9	Imperceptible	Negligible
7-11	1.4	0.7	0.9	0.2	Imperceptible	Negligible
7-14	13.4	9.1	10.4	1.3	Small	Negligible
7-15	9.5	6.2	7.2	1.0	Imperceptible	Negligible

Receptor	PM10 90.4th percentile of 24-hour concentrations (µg/m^3)			Change in concentrations (µg/m^3)	Magnitude of change	Impact descriptor
	2012 baseline	2017 without Proposed Scheme	2017 with Proposed Scheme			
7-16	8.3	5.3	6.2	0.9	Imperceptible	Negligible
7-17	6.9	4.2	5.0	0.8	Imperceptible	Negligible
7-18	2.9	1.5	2.0	0.5	Imperceptible	Negligible

Table 14: Critical level assessment for the protection of vegetation

Receptor	NOx concentrations (µg/m^3)							
	2012 baseline	2017 without Proposed Scheme	2017 with Proposed Scheme	Change in concentrations (µg/m^3)	Critical level (µg/m^3) (annual mean)	Change in concentrations as % of critical level	Total NOx as a % of critical level	Potentially significant? [18]
7-12 (10m)	58.7	44.8	46.8	2.0	30.0	6.7	155.9	Yes
7-12 (20m)	47.9	36.8	38.1	1.2	30.0	4.1	126.9	Yes
7-12 (50m)	38.2	29.8	30.3	0.5	30.0	1.8	101.2	Yes
7-12 (100m)	34.1	26.8	27.1	0.3	30.0	0.9	90.3	No
7-12 (150m)	32.7	25.8	26.0	0.2	30.0	0.6	86.6	No
7-12 (200m)	31.9	25.2	25.3	0.1	30.0	0.4	84.4	No
7-13 (20m)	139.6	96.6	105.5	8.9	30.0	29.8	351.7	Yes
7-13 (50m)	88.6	63.2	67.6	4.4	30.0	14.8	225.4	Yes
7-13 (100m)	68.2	49.9	52.5	2.6	30.0	8.8	175.1	Yes
7-13 (150m)	59.3	44.2	46.0	1.8	30.0	6.1	153.3	Yes
7-13 (200m)	55.3	41.6	43.0	1.5	30.0	4.8	143.4	Yes

Table 15: Critical load - nutrient nitrogen deposition

Receptor	Nitrogen deposition rate (kg N/ha/year)							
	2012 baseline deposition	**2017 without Proposed Scheme**	**2017 with Proposed Scheme**	**Change in deposition**	**Critical load range (kg N/ha/year)**	**Change in deposition as % of critical load**	**Total nitrogen deposition as a % of critical load**	**Potentially significant?[18]**
7-12 (10m)	22.0	25.0	25.2	0.3	15-25	1.9 (low) 1.2 (high)	168.3 (low) 101.0 (high)	No
7-12 (20m)	22.0	23.8	24.0	0.2	15-25	1.2 (low) 0.7 (high)	160.0 (low) 96.0 (high)	No
7-12 (50m)	22.0	22.8	22.9	0.1	15-25	0.5 (low) 0.3 (high)	152.5 (low) 91.5 (high)	No
7-12 (100m)	22.0	22.4	22.4	0.0	15-25	0.3 (low) 0.2 (high)	149.4 (low) 89.7 (high)	No
7-12 (150m)	22.0	22.2	22.3	0.0	15-25	0.2 (low) 0.1 (high)	148.3 (low) 89.0 (high)	No
7-12 (200m)	22.0	22.1	22.2	0.0	15-25	0.1 (low) 0.1 (high)	147.7 (low) 88.6 (high)	No
7-13 (20m)	19.9	29.0	30.3	1.3	20-30	6.4 (low) 4.3 (high)	151.7 (low) 101.1 (high)	Yes
7-13 (50m)	19.9	24.2	24.9	0.6	20-30	3.2 (low) 2.1 (high)	124.4 (low) 82.9 (high)	No
7-13 (100m)	19.9	22.3	22.7	0.4	20-30	1.9 (low) 1.3 (high)	113.5 (low) 75.7 (high)	No

Receptor	Nitrogen deposition rate (kg N/ha/year)							
7-13 (150m)	19.9	21.5	21.8	0.3	20-30	1.3 (low) 0.9 (high)	108.8 (low) 72.5 (high)	No
7-13 (200m)	19.9	21.1	21.3	0.2	20-30	1.0 (low) 0.7 (high)	106.7 (low) 71.1 (high)	No

6 Assessment of significance

6.1.1 The significance of the impacts on air quality from construction traffic associated with the Proposed Scheme has been assessed in accordance with the EPUK methodology[16]. AQMAs cover the entire study area and pollution levels exceed air quality standards in many locations particularly along major roads.

6.1.2 The DMRB assessment identified two locations along the B467 Swakeleys Road where there may be substantial adverse impacts from traffic during the construction phase. The ADMS-roads assessment predicted that there will be numerous locations along Swakeleys Road, between the A40 Western Avenue and Harvil Road, where air quality standards are exceeded, with and without the Proposed Scheme, where concentrations of NO2 and PM10 increase with the Proposed Scheme.

6.1.3 NO2 impacts are predicted to be moderate or substantial adverse at numerous receptor locations along the southern section of Swakeleys Road. PM10 impacts are predicted to be negligible at the same locations. The NO2 impacts will give rise to significant effects. These will, however, be of limited duration and limited to within a few metres of the roadside.

6.1.4 With regard to sensitive ecological habitats, a potential significant impact was predicted for parts of the Mid Colne Valley SSSI adjacent to the A412 Denham Way and parts of the Fray's Farm Meadows SSSI, adjacent to the A40, for total NOx, concentrations following a DMRB assessment. Nutrient nitrogen was also found to be potentially significant at the Fray's Farm Meadows SSSI in the DMRB assessment.

6.1.5 Following a more detailed assessment using ADMS roads, it was found that changes to air quality will have a potentially significant effect for total NOx on those parts of the Mid Colne Valley SSSI within 100m of the road. A potentially significant effect was identified in respect of NOx deposition on those parts of Fray's Farm Meadows SSSI within 200m of the road, taking into account background concentrations of NOx, and in respect of nutrient nitrogen deposition within 50m of the road. This impact will be small, temporary, affect only a very small fraction of the site and will not be a significant effect on the integrity of the site.

6.2 Operational traffic model

6.2.1 Operational traffic data on which this assessment is based are detailed in Volume 5: Appendix TR-001-000. Scenarios assessed were based on maximum traffic on affected roads during the operational phase of the Proposed Scheme.

Receptors assessed

6.2.2 Tilehouse Lane met the criteria for assessment outlined in the SMR due to realignment. There are no receptors close to the realigned section. Therefore, no receptors were assessed.

Assessment of significance

6.2.3 There will be no changes to air quality during the operational phase that are more than negligible and therefore there will be no significant effect on receptors.

7 References

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